Journal of the Lepidopterists' Society
39(1), 1985, 9–12

NOTES ON THE LARVA AND BIOLOGY OF *MOODNA BISINUELLA* HAMPSON (PYRALIDAE: PHYCITINAE)[1]

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ABSTRACT. The last stage larva of *Moodna bisinuella* Hampson is described, and the biology of this phycitine with reference to gama grass (*Tripsacum*) in North Carolina is briefly outlined.

Recently, gama grass (*Tripsacum* sp.) was brought to Raleigh, North Carolina from Mexico and planted on a research farm as part of a plant breeding program. Inadvertently, phycitine larvae were introduced with the plants. Injury to the plants eventually prompted the collection of larvae and rearing of adults. Adults were identified as *Moodna bisinuella* Hampson, a species of economic importance in Central America. Although the phycitines were eradicated from the grass in North Carolina after the insects were identified, notes taken and larval specimens obtained during the rearing procedures provided worthwhile information relative to this pest. Little has been published regarding the appearance of the immature stages and biology of *M. bisinuella*. Previous authors have only mentioned a few morphological features of the larva (Capps, 1963) and merely stated that the species feeds as a larva in the ears of soft or "green" corn (*Zea mays* L.) (Capps, 1963; Heinrich, 1956). In this paper, I describe the last stage larva in detail and briefly discuss the biology of *M. bisinuella* in association with its previously unreported host, gama grass.

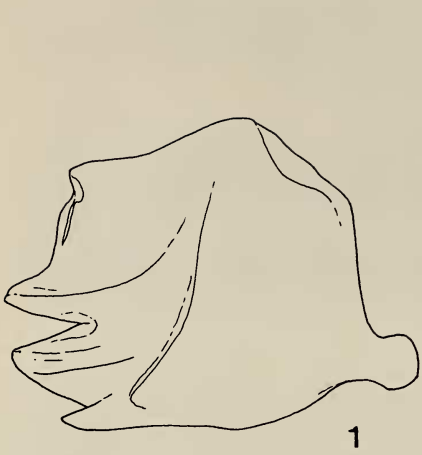
Description of Last Stage Larva

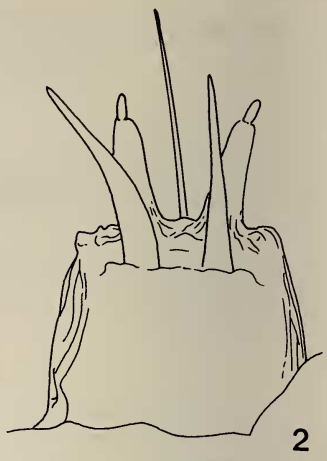
General. Length 10.2–16.0 mm, avg. 13.5 mm.

Color. Head yellowish brown (at times with green undertones in living larva); tonofibrillary platelets pale brown, indistinct; usually, a pale brown to brown patch within arc of stemmata and pale brown to brown streaks near notch of postgenal region (these 2 pigmented areas sometimes coalescing); hypostoma with brown to black markings; mandibles yellowish brown between articulations becoming dark brown along lateral margins and distally.

Prothoracic shield pale yellow to pale brown with lateral and posterior margins darker (green undertones in living larva). Prespiracular plate yellowish brown to dark brown. Remainder of prothorax white to yellowish white overlaid with brown to gray integu-

[1] Paper No. 9067 of the Journal Series of the North Carolina Agricultural Research Service, Raleigh, North Carolina 27650.





FIGS. 1, 2. *Moodna bisinuella* Hampson. **1**, mesal aspect of right mandible of last stage larva. **2**, dorsal aspect of part of right maxilla of last stage larva.

mental granules (living larva with remainder of prothorax pale red to red with brown to gray granules and scattered blue undertones; red pigmentation usually more intense on mesothorax and metathorax, and blue more pronounced laterally and ventrally); mesothoracic pinaculum ring pale brown to dark brown, white within ring; thoracic legs mostly pale brown to brown.

Abdomen similar to mesothorax and metathorax; eighth abdominal segment pinaculum ring pale brown to brown; anal shield pale yellow to yellowish brown with slightly darker margins.

Morphological features: Head. Width 0.83–0.93 mm, avg. 0.90 mm; surface slightly uneven; adfrontals reach ca. ⅝ distance to epicranial notch; AF2 setae usually slightly ventrad of level at which epicranial suture forks; AF2 setae slightly above imaginary line between P1 setae; P1 setae further apart than P2 setae; labrum shallowly notched; mandibles simple, distal teeth distinct (Fig. 1); sensilla trichodea of maxillae simple (Fig. 2). Spinneret moderately long.

Prothorax. On shield, distance between D1 setae less than distance between XD1 setae; on each side of shield, distance between SD1 and SD2 greater than distance between SD1 and XD2, distance between D1 and D2 greater than distance between D1 and XD1, and XD2, SD1 and SD2 form an acute angle; L setae of each side in a nearly vertical configuration.

Mesothorax and metathorax. SD1 pinaculum rings of mesothorax well developed; SD1 setae of mesothorax ca. 2 times as long as SD1 setae of metathorax; SD1 and SD2 pinacula of metathorax fused; D1 and D2 pinacula of metathorax fused.

Abdomen. D2 setae of anterior segments ca. 0.4 mm long; D1 setae of anterior segments ca. as long as D2 setae; distance between D2 setae on segments 1–7 slightly greater than distance between D1 setae; distance between D1 and D2 on each side of segments 3–6 about same as distance between D1 and SD1; SD1 setae of segments 1–7 without pinaculum rings; crochets in a biordinal ellipse, avg. number on prolegs of segments 3, 4, 5, 6, and anal segment, 50, 56, 57, 58, and 49, respectively; vertical diam. of spiracles on segment 8 ca. ⅓ larger than same diam. of spiracles on segment 7; horizontal diameter of spiracle of each side of segment 8 slightly less than distance between L1 and L2; SD1 pinaculum rings of segment 8 relatively broad but appearing incomplete; SD1 setae of segment 8 ca. 1.9 times longer than SD1 setae of segment 7; 2 SV setae on each side of segment 8; distance between D1 and D2 on each side of segment 9 ca. 3 times distance between D1 and SD1; 2 SV setae on each side of segment 9.

FIGS. 3, 4. Seeds of gama grass infested with last stage larvae of *Moodna bisinuella* Hampson.

Material Examined

North Carolina: Raleigh; 5 larvae, *Tripsacum* sp. seed, 19-IX-80, Coll. H. H. Neunzig; 11 larvae, *Tripsacum* sp. seed, 30-IX-80, Coll. H. H. Neunzig. These specimens have been deposited in the NCSU Insect Collection.

Biology and Discussion

In North Carolina, *M. bisinuella* overwintered as diapausing larvae within silk enclosures constructed at the inner base of gama grass. Pupation occurred in the spring, and adults emerged in April and May. Oviposition and larval feeding sites for the spring generation could not be determined. Larvae of the summer generation (July–September) were all found associated with the seeds of gama grass. These larvae fed on the well-developed, but more or less soft, seeds. Usually this occurred while the seeds were still attached to the plant, but seeds that had fallen from the plant were also eaten. The seeds were bored into and frass and silk extruded from the entrance hole (Figs. 3 & 4). Several seeds were eaten by each larva as it developed. Ergot (*Claviceps* sp.), which was at times associated with gama grass seed, was also sometimes ingested by the larvae.

The fact that *M. bisinuella* feeds on gama grass as well as corn supports the botanical view that the two plant genera (*Tripsacum* and *Zea*) are closely related (they are considered by most botanists to be the only members of the New World tribe Maydeae). In Central America, where the two plants sometimes grow in close proximity, wild communities of gama grass are in all likelihood providing a reservoir of *M. bisinuella* that periodically infest fields of corn.

ACKNOWLEDGMENTS

D. L. Stephan of the Plant Disease and Insect Clinic of North Carolina State University made available to the author the initial series of larvae of *M. bisinuella* collected in North Carolina.

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